

5 **A MOBILE VIRTUAL NETWORK OPERATOR PLATFORM
 AND METHOD OF AND SYSTEM FOR USING SAME**

10 FIELD OF THE INVENTION

1. BACKGROUND OF THE INVENTION

 The present invention relates to telecommunication system architectures and methods of providing telecommunication services between one or more remote units and a central location, and, more particularly to systems and methods that include
15 a universal virtual carrier or "mobile virtual network operator" to enable one or more personal communication system networks and users thereof to communicate with one or more wireless application operators irrespective of the air interface protocol used by the personal communication system and/or the wireless network used by the latter.

20

2. DESCRIPTION OF THE RELATED ART

 Wireless communications, which can provide virtually immediate access to voice telephone services and/or data at practically any location and at practically any time, are well established throughout the United States and much of the rest
25 of the world. Presently, a common, and possibly the most common, wireless communication application comprises a cellular telephone network. Cellular telephone networks operate much like traditional, i.e., "wireline", telephone services, essentially substituting radio frequencies for telephone wires. Indeed, cellular telephone networks enable a large number of transceivers, e.g.,
30 portable/mobile/transportable wireless devices, to communicate via a base

station or satellite, which are favorably situated to provide coverage in a geographical cell.

Typically, cellular telephone networks include a plurality of portable/mobile/transportable wireless devices, e.g., telephone units, a plurality of
5 contiguous cell sites each having a base station therein, a Mobile Telephone Switching Center (MTSC), and all necessary system interconnections. The wireless devices, which, typically, can be hand-held or vehicle-mounted, communicate by radio frequency with a base station in each cell. Each base station includes one or more radio transceivers and a control unit. The radio
10 transceivers transmit and receive control and usage signals between the MTSC and the telephone units. The MTSC, in turn, controls the switching between cell sites and the wireline Public Switched Telephone Network (PSTN).

In one exemplary application, the MTSC receives a call directed to a discrete mobile telephone unit from the PSTN. The MTSC deciphers the mobile
15 telephone unit address and signals the appropriate cell control unit. The cell control unit then pages the discrete mobile telephone unit addressee. More specifically, the radio transceiver, which operates at the same frequency(ies) as the mobile telephone units in its cell, transmits control data to the discrete mobile telephone unit alerting it that the MTSC is sending it a call. Moreover, the
20 control unit typically alerts the mobile telephone unit as to which user, or voice, channel the call has been assigned. The radio transceiver then relays the call to the mobile telephone unit over the identified user channel.

In another application, mobile telephone units transmit control data to the control unit of a cell, alerting the control unit that the mobile telephone unit
25 wants to place a call directed to a discrete telephone number on the PSTN, e.g.,

by radio-wire-interface, or to another mobile telephone unit in the same or another cell. The cell control unit transmits the data to the MTSC. The MTSC deciphers the desired telephone number and dials the number over the PSTN; or, alternately, the MTSC deciphers the mobile telephone unit address and signals
5 the appropriate cell control unit as described above.

A problem with current wireless communications, however, is that air interface standards, e.g., access schemes, between base stations and telephone units are not universally applied. Indeed, the more common access schemes include, inter alia, Global Standards for Mobile Communications (GSM), Time
10 Division Multiplexing Access (TDMA), Frequency Division Multiplexing Access (FDMA), Coded Division Multiplexing Access (CDMA), and integrated digital enhanced network (iDEN) techniques. The function of each air interface standard, however, is to facilitate communications in a multiple access environment efficiently. More precisely, the purpose of the access technique is to
15 provide simultaneous telecommunication service to multiple users without interference, i.e., collisions whereby simultaneous transmissions in a cell "collide" with each other.

TDMA techniques represent a carry-over from wireline applications. Just as speech signals from a plurality of lines are encoded, combined, and
20 transmitted in a series of frames over a wireline, TDMA techniques divide multiple signals temporally for broadcast over a single radio frequency (RF) channel during a pre-established time interval. Indeed, with TDMA, each time interval contains a series of smaller time frames, or slots, which are separated temporally. Each of the time slots contains data from a single caller to a single

telephone unit. Thus, each transmission is isolated from adjacent transmissions, which prevents collision.

By comparison, FDMA techniques assign different frequency slots to each transmission. Accordingly, communication between a base station and a mobile
5 telephone unit is substantially continuous instead of comprising a series of time frames. Moreover, each transmission is confined to a discrete frequency, which separates multiple transmissions to prevent collision.

Furthermore, in contrast, CDMA techniques simultaneously transmit a plurality of encoded signals over a common spectrum band, which signals can be
10 interpreted only if the transceiver and mobile telephone unit are properly encrypted. Accordingly, transmissions are not isolated temporally from adjacent transmissions as with TDMA or confined to a separate frequency as with FDMA.

These various techniques as well as others not described herein but well-known to the art are incompatible with one another insofar as a transceiver
15 designed for a TDMA interface cannot communicate intelligently with a telephone unit designed for either a FDMA or a CDMA interface and vice versa. This lack of uniformity or standardization poses a serious problem for those trying to further standardize wireless communication.

Furthermore, personal communication networks and, more particularly,
20 personal communication systems (PCS) offer wireless communication access in a similar fashion to the cellular telephone network; however, the services generally are provided in a single cell, or over a limited geographical area. Inventions, such as disclosed in U.S. Patent No. 5,457,736 to Cain, et al., have dealt with handover functionality, which allows the PCS to expand its geographical borders.
25 Indeed, the patent to Cain, et al. discloses a system including a Distributed Radio

Port Controller architecture, comprising a plurality of radio port controllers that are interconnected by voice and signal circuits that control a plurality of radio ports, each port having a corresponding geographical coverage area.

The telecommunications industry exhibits increasing interest in wireless communication systems that communicate data, i.e., "non-speech", and/or voice, i.e., "speech", between a plurality of remote sites and/or between a remote site and a central location. Indeed, throughout the United States and much of the rest of the world, voice and data communications are transmitted over existing wireline and wireless communication networks. However, in the competitive, fast-changing telecommunications industry, service providers typically offer their customers either "voice" services or "data" services, but generally not both. For example, Personal Communication Services (PCS) carriers, e.g., cellular phone companies, are voice-centric, providing a plethora of bi-directional, digital, voice-based services but having little or nothing to offer with respect to data transmission. Wireless application providers, e.g., beepers, pagers, personal digital assistants (PDA's), short message services (SMS), and the like, on the other hand, provide textual data to customers through one or more analog applications, but little or no voice. Given the vast capability of existing telecommunication networks and telecommunication equipment to transmit and receive both voice and data over existing networks, it remains a mystery that PCS carriers and wireless providers are not motivated to effect a crossover to the other dimension.

Wireless providers, in most instances, would prefer using a PCS network for delivery of data streams. Indeed, PCS networks are digital; far more secure; and have a greater coverage area.

A possible explanation as to why PCS carriers have not formed strategic alliances with wireless providers may be because wireless operators generally provide only a limited number of applications. Consequently, although there are countless wireless applications made available to consumers, there is no
5 single source for all possible wireless applications. Furthermore, this condition is exacerbated by wireless providers using a myriad of alternative and/or proprietary wireless networks, e.g., RAM, ARDIS, MOBITECH, CPDP, and ReFLEX to name just a few. Consequently, selecting a single wireless provider or the "wrong" wireless provider can be restrictive, can alienate customers, and can
10 impact client base and revenue.

Such an alliance between PCS carriers and wireless providers also would require PCS carriers to perform at least one of the following: (i) retrain sales force; (ii) educate or re-educate customer base; (iii) undertake new marketing campaigns; (iv) require new billing procedures; (v) design and manufacture a
15 new line of telecommunication devices; and/or (vi) require additional network resources to handle additional traffic. Indeed, the frequency of some wireless applications is estimated at about once every 8 or 10 seconds, whereas the frequency of most voice applications is far greater.

Furthermore, voice-based PCS networks tend to be digital, which makes
20 accommodating the next generation of devices easier. Wireless operators, however, prefer analog devices, which, in most cases, must be completely re-designed as technology advances to another generation.

SUMMARY OF THE INVENTION

Therefore, it would be desirable to produce a virtual carrier, e.g., a mobile virtual network operator, that enables a plurality of wireless operators to communicate and/or interface with a plurality of PCS carriers irregardless of the
5 protocol techniques used by any of the wireless operators and/or the PCS carriers.

Furthermore, it would be desirable to produce a method and a system for aggregating a number of wireless operators, which offer fewer than all available data applications and which, further, operate on one or more unique networks,
10 into a single platform that can interface with one or more PCS carriers, which carriers operate using one or more air interface protocols.

Accordingly, the present invention produces a method and a system that allows wireless carriers to offer their customers with short message service (SMS) and bi-directional data transmission applications.

15 Furthermore, the present invention produces a method and a system for providing bi-directional voice and data transmissions that is compatible with all wireless operators and all wireless standards.

Additionally, the present invention produces a method and system for providing wireless operators with reliable SMS and bi-directional data
20 transmission applications at low cost.

Furthermore, the present invention produces a method and system for providing wireless operators with SMS and bi-directional data transmission applications using current and future, e.g., 2.5G/3G, PCS/ cellular technologies.

According to one aspect of the present invention, the invention produces:

a mobile virtual network operator for providing a plurality of wireless applications from one or more wireless application operators to one or more personal communication system carriers, the network operator comprising:

5 a short message system center interface that enables the network operator to communicate with the one or more personal communication system carriers through one or more short message system centers using one or more air interface access techniques; and

10 an application aggregation device that enables the network operator to communicate with said one or more wireless application operators, further enabling the network operator to provide one or more wireless applications to a plurality of remote user units through one or more personal communications system.

15 According to another aspect of the present invention, the invention produces:

a system for providing one or more personal communication systems, operating using one or more air interface protocols carriers, with a plurality of wireless applications from one or more wireless application operators, the system comprising:

20 a network, having a plurality of system interconnections; and
a mobile virtual network operator.

According to yet another aspect of the present invention, the invention produces:

a method of providing a plurality of wireless applications from one or more wireless application operators to one or more personal communication system

5 carriers, the method comprising the steps of:

providing a short message system center interface that enables the network operator to communicate with the one or more personal communication system carriers through one or more short message system centers using one or more air interface access techniques; and

10 providing an application aggregation device that enables the network operator to communicate with said one or more wireless application operators, further enabling the network operator to provide one or more wireless applications to a plurality of remote user units.

15 BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the nature and desired objects of the present invention, reference is made to the following detailed descriptions and the accompanying drawings. In the drawings, like reference characters denote corresponding parts throughout the several views.

20

FIG. 1 provides an illustrative embodiment of one aspect of a system in accordance with the present invention;

FIG. 2 provides an illustrative embodiment of one aspect of a mobile virtual network operator; and

FIG. 3 provides an illustrative embodiment of one aspect of a method of providing a plurality of wireless applications to users of one or more PCS carriers in accordance with the present invention.

5

DETAILED DESCRIPTION OF THE INVENTION AND PREFERRED EMBODIMENTS THEREOF

The system of the present invention will be described in greater detail with reference to the drawings. FIG. 1 illustrates one aspect of the present invention, which is shown for illustrative purposes only and is not to be taken or construed as being limited thereto. The system 10 of the present invention comprises the combination of a wireless communication network 20, a short message service center (SMSC) 30, a plurality of data-based applications 40, a mobile virtual network operator (MVNO) 50, and a plurality of system interconnections 60. Peripheral to the system 10 can be at least one of the following: a plurality, or, more preferably, a multiplicity, of telemetry units 22, a plurality, or, more preferably, a multiplicity, of telematic units 24, a plurality, or, more preferably, a multiplicity, of wireless (telephone) devices 26; one or more databases 80, and a public switched telephone network (PSTN) 70.

Preferably, the wireless communication network 20 is of a type that is well known to the art. Indeed, in a preferred embodiment of the present invention, the network 20 of the present invention can include one or more existing, subscriber-based, wireless carrier communication networks, e.g., PCS networks, that use any of the air interface access techniques described above, e.g., GSM, TDMA, FDMA, CDMA, iDEN and the like, which can include proprietary protocols such as Parlay, SMPP, UCP, OIS, CIMD, and the like. Alternately, the network

20 can include a unique communication network 20 that has been established expressly for this application.

Preferably, the wireless communication network 20 communicates with a plurality, or, more preferably, a multiplicity, of remote users 22, 24 and 26, which transmit one or more types of information, e.g., voice, binary data, and the like. Examples of remote user types include, inter alia, telemetry units 22, telematic units 24, and wireless devices 26. Telemetry units 22, typically, are configured and arranged to transmit raw data, e.g., utility meter readings, in a binary format to a remote data collection unit either on request, e.g., in response to SMSC 30 messaging, or at a prescribed date and/or time. Telematic units 24, e.g., personal digital assistants (PDAs), pagers, beepers, and the like, typically are configured and arranged to provide any one of a variety of wireless application services. Wireless devices 26 can be configured and arranged to support bi-directional transmission of voice and data communications. The means and methods of transmitting binary data by telemetric and telematic units 22 and 24 and transmitting voice and data communications by wireless devices 26 are well known to the art and will not be described further herein.

The wireless communication network 20 of the present invention further includes a plurality of contiguous cells that cover a defined geographical area. Cellular networks are well known to the art and will not be described in detail herein. Each cell of the network 20 includes one or more base stations (not shown), which are integrally connected to one or more Mobile Telephone Switching Centers (MTSC) (not shown). Base stations typically include a combination of one or more antennae and one or more transceivers, which combination is used to transmit data to and receive data from remote users 22,

24 and 26, and transmission equipment, which enables the base station to communicate with the MTSC.

Additionally, the MTSC is configured and arranged to communicate with and through the Public Switched Telephone Network (PSTN) 70 or other
5 equivalent telephone network for the purpose of transmitting and receiving "calls", respectively, to and from a wireline network (not shown) and, moreover, to communicate with the SMSC 30.

The Short Message Service Center (SMSC) 30 of the present invention can be of a type that is well known in the art. Indeed, preferably, the SMSC 30 is
10 configured and arranged to communicate textual and binary messages to remote users 22, 24, and 26 without establishing a circuit, or call, connection therebetween. Additionally, the SMSC 30 is configured and arranged to facilitate communication with the MVNO 50. **[Probably need to expand this. What else does SMSC do?]**

15 One aspect of the Mobile Virtual Network Operator (MVNO) 50, which is an essential element of the present invention, will now be described referring to FIG. 2. FIG. 2 shows only an illustrative embodiment of the elements of the MVNO 50; however, the embodied MVNO 50 is not to be taken or construed as being limited thereto. In its broadest terms, the MVNO 50 is a "middleware"
20 system comprising one or more servers (not shown), e.g., microprocessors, as well as a plurality of software processes, e.g., source code-designed algorithms.

Preferably, the MVNO 50 includes an application aggregation function 45 that is configured and arranged to host a plurality of wireless data applications
40 concurrently. More preferably, a plurality of wireless operators provides a
25 multiplicity of wireless data applications 40 using the same or a different wireless

networks. The application aggregation function 45 is further configured and arranged to manage data streams to and from the applications 40. **[Does the application aggregate function convert data to streaming IP?]** According to one aspect of the present invention, wireless operators that communicate with the MVNO can continue to provide wireless data applications 40 using existing hardware and software in any appropriate manner. The application aggregate function 45 further aggregates the multiplicity of wireless applications 40, providing remote users 22, 24 and 26 with a plurality of wireless applications 40.

Preferably, the MVNO 50 further includes an Internet and wireless access protocol (WAP) gateway function 52. The gateway function 52 receives incoming data, e.g., from the Internet 55, that is formatted in a first language, e.g., hyper-text mark-up language (HTML), wireless mark-up language (WML) and the like, and reformats the data to any desired second language, e.g., ASCII, extensible mark-up language (XML), and the like. Once incoming data has been reformatted, the MVNO 50 can transmit the data to one or more remote users 22, 24, and 26. The opposite is also true. Indeed, the gateway function 52 of the MVNO 50 can receive incoming data, e.g., from a wireless device 26, that is formatted in a first language, e.g., ASCII, XML, and the like, and converts the data to a second language, e.g., HTML, WML, and the like. Once incoming data has been reformatted, the MVNO 50 can transmit the data to any uniform resource locator (URL) address on the Internet 55.

In another aspect of the present invention, the MVNO 50 further includes a hosting function 53 for one or more wireless electronic mail (email) providers. The mail client hosting function 53 preferably comprises off-the-shelf software of a type that is well known in the art for providing an interface with email and

email service providers. The mail client hosting function 53 is configured and arranged to (i) enable telematic units 24 and wireless devices 26 to create, send, and receive short data messages; (ii) save undelivered or non-accessed email in a message database 59 provided therefor, (iii) forward undelivered or non-accessed
5 email to telematic units 24 and/or wireless devices 26 on demand; and (iv) forward unsolicited notification that undelivered or non-accessed email is being stored in the message database 59 of the MVNO 50 to telematic units 24 and wireless devices 26.

Preferably, the MVNO 50 also comprises a cross-operator router 54 in
10 combination with a cross-technology handling function 55. The cross-technology handling function 55 and router 54 are configured and arranged to enable the exchange of voice and data messages between remote users 22, 24 and 26 who subscribe to any one of a plurality of PCS carriers. More preferably, the cross-technology handling function 55 and router 54 are configured and arranged to
15 provide common messaging between subscribers having different PCS carriers and different air interfaces. **[Probably need more about this feature.]**

In another aspect of the present invention, the MVNO 50 further comprises a message processor 56 and a message routing function 57. The message processor 56, e.g., a software algorithm of a type that is well known to
20 the art, is configured and arranged to read or scan every incoming message to ascertain whether or not the incoming message contains appropriate content to trigger transmission of a short notification message to a remote unit 22, 24, and 26. Preferably, the message processor 56 searches the text of the message for one or more keywords. Keywords can come from a general library of keywords,
25 which is stored in memory 80, or, alternately, discrete users can generate their

own, user-specific keyword libraries, which libraries likewise can be stored in memory 80. Accordingly, when the message processor 56 detects or identifies one or more keywords in the text of an incoming message, the message processor 56 automatically transmits the message to the SMSC 30 for transmission to the
5 appropriate remote unit 22, 24, and 26.

Typically, "short messages" comprise fewer than about 160 characters. Accordingly, in a separate embodiment, the message processor 56 automatically crops the message into message blocks comprising 160 characters or less. For example, the message processor 56 would transmit an incoming message
10 containing 480 characters in three stages of 160 characters each.

Furthermore, a message routing function 57 is configured and arranged to transmit messages from remote users 22, 24, and 26 to the appropriate wireless application 40. If a message is undelivered or not accessed, the message routing function 57 automatically stores the message in a message database 59 and,
15 moreover, provides the remote user 22, 24, and 26 through the SMSC 30 with notification that an undelivered or non-accessed message is being stored in the message database 59.

In one aspect of the present invention, the MVNO 50 can include a plurality of databases 80. One such database, comprises a subscriber database
20 58, which can be included or stored in the random access memory (RAM) or read-only memory (ROM) of at least one server. The subscriber database 58 is configured and arranged to store the identities of all subscribers to the system
10. For example, the subscriber database 58 can include at least one of subscriber's names, personal identification numbers, passwords, passphrases,
25 and the like. The subscriber database 58 also can include a security algorithm

or other similar alternative security measures that are well known to the art to enable the server to verify the identity of a subscriber.

Several uses of the message database 59 have been described previously in this disclosure. Preferably, an additional function of the message database 59
5 is to store all incoming messages for archiving data for subscribers, e.g., work orders, billing data, and the like. As a result, subscribers can access such information at any time. Moreover, third parties can use the information for demographic and/or statistical studies.

In a preferred embodiment, the MVNO 50 further comprises a billing
10 engine 51. Preferably, in general terms, the billing engine 51 tracks, e.g., counts and times, the number and duration of messages and/or calls (collectively "calls") flowing through the MNVO 50. In more specific terms, the billing engine 51 is configured and arranged to create data records of all calls. Such data records can be used to provide billing to users as well as to the PCS carriers, i.e., reverse
15 billing. Furthermore, the billing engine 51 can be configured and arranged to produce multiple tariffs for various subscribers. In this manner, the MVNO 50 can eliminate the need of the various PCS carriers to have their own billing engine.

Another important aspect of the MVNO 50 is the SMSC interface 35,
20 which is a gateway interface. Indeed, the SMSC interface 35 enables the MVNO 50 to communicate with one or more PCSs 20 via the SMSC 30. In a preferred embodiment of the present invention, the one or more PCSs 20 can use the same or air interface protocols. Accordingly, the SMSC interface 35 is capable of converting communication originating from, e.g., a user of one PCS 20 having a
25 first air interface protocol or a call originating from the PSTN 70 to a format that

is compatible with a different, second air interface protocol of the user called.

[Include more details on the SMSC?]

5 A discussion of a method of producing a PCS that provides a plurality, or more preferably a multiplicity, of wireless applications from one or more wireless application operators to users of one or more personal communication system carriers will now be described using FIG. 3. Indeed, the method comprises the steps of providing a SMSC interface that enables the MVNO to communicate with the users of one or more PCS carriers through one or more SMSC's using one or more air interface access techniques S1; and providing an application
10 aggregation device that enables the MVNO to communicate with one or more wireless application operators, further enabling the network operator to provide one or more wireless applications to a plurality of remote user units S2.

Accordingly, users

15 In another aspect of the present invention, the method further comprises the step of providing an Internet gateway that converts and reformats a first text or binary language to a second text or binary language to enable communication of data information between the plurality of remote user units and one or more Internet Service Providers S3.

20 In yet another aspect of the present invention, the method further comprises the steps of providing one or more databases S4, wherein said one or more databases comprises at least one of a message database and a subscriber database; providing a mail client function S5 for use as described above; providing a message routing function S6 for use as described above; providing a cross-technology handling function S7 for use as described above; and providing
25 one or more billing engines S8 for use as described above.

Although the present invention has been as described in detail with reference to its preferred embodiments, it should be readily apparent to those skilled in the art that changes and modifications in form and details can be made without departing from the scope and spirit of this disclosure.

30 For example, although the specification has described network communication where the network is a PCS, the network should not be taken or

construed as limited thereto. Indeed, in alternate embodiments, the network can be a special mobile radio (SMR) network, a cellular network or an iDEN wireless network.

What is claimed is:

1. A system for providing one or more personal communication systems, operating using one or more air interface protocols carriers, with a plurality of wireless applications from one or more wireless application operators, the system comprising:
 - a network, having a plurality of system interconnections; and
 - a mobile virtual network operator.
2. The system as recited in claim 1, wherein the network comprises one or more personal communication networks.
3. The system as recited in claim 1, wherein the one or more air interface protocols comprises at least one of global standards for mobile communications (GSM), time division multiplexing access (TDMA), frequency division multiplexing access (FDMA), code division multiplexing access (CDMA), and integrated digital enhanced network (iDEN).
4. The system as recited in claim 1, wherein the network can communicate with at least one of a plurality of remote wireless devices, a plurality of telematic units, and a plurality of telemetry units.
5. The system as recited in claim 1, wherein the network can communicate with at least one of a Personal Communication System (PCS) network, a Cellular network, a Special Mobile Radio (SMR) network, and an iDEN wireless network. **[Doesn't the network also communicate with the PSTN?]**
6. The system as recited in claim 5, wherein the mobile virtual operator network can communicate with one or more users of at least one of the Personal Communication System (PCS) network, the Cellular network, the Special Mobile Radio (SMR) network, and the iDEN wireless network.
7. The system as recited in claim 1, wherein the system further comprises a short message service center that communicates with at least one of the

wireless application operators and at least one personal communication system (PCS) carrier via a short message center interface.

8. The system as recited in claim 7, wherein the short message service center communicates with the at least one wireless application operator.

9. The system as recited in claim 7, wherein the short message service center communicates with the at least one PCS carrier via the mobile virtual network operator.

10. The system as recited in claim 1, wherein the mobile virtual network operator communicates with one or more databases.

11. The system as recited in claim 1, wherein the system further comprises a public switched telephone network that is in communication with the network.

12. A mobile virtual network operator for providing a plurality of wireless applications from one or more wireless application operators to one or more personal communication system carriers, the network operator comprising:
a short message system center interface that enables the network operator to communicate with the one or more personal communication system carriers through one or more short message system centers using one or more air interface access techniques; and
an application aggregation device that enables the network operator to communicate with said one or more wireless application operators, further enabling the network operator to provide one or more wireless applications to a plurality of remote user units through one or more personal communications system.

13. The network operator as recited in claim 12, wherein the network operator further comprises an Internet gateway that converts and reformats a first text language to a second text language to enable communication of data information between the plurality of remote user units and one or more Internet Service Providers.

14. The network operator as recited in claim 12, wherein the network operator further comprises an Internet gateway that converts and reformats a first binary language to a second binary language to enable communication of data information between the plurality of remote user units and one or more Internet Service Providers.

15. The network operator as recited in claim 12, wherein the plurality of remote user units includes at least one of a plurality of remote wireless devices, a plurality of remote telematic units, and a plurality of remote telemetry units.

16. The network operator as recited in claim 12, wherein the network operator further comprises:

- one or more databases, wherein said one or more databases comprises at least one of a message database and a subscriber database;

- a mail client function, wherein said function enables remote user units to communicate with others by way of electronic mail services;

- a message processor, wherein said processor reads all messages coming into said network operator; and

- a cross-operator router, wherein said router enables transmission of at least one of voice and data messages even if transmission requires formatting said at least one of voice and data messages into a second air interface protocol.

17. The network operator as recited in claim 16, wherein the message processor includes a message routing function, whereby a plurality of messages is intelligently routed to the destined PCS carrier.

18. The network operator as recited in claim 16, wherein the cross-operator router includes a cross-technology handling function, whereby a plurality of messages can be delivered to the destined PCS carrier.

19. The network operator as recited in claim 12, wherein the network operator further comprises at least one billing engine.

20. A method of providing a plurality of wireless applications from one or more wireless application operators to one or more personal communication system carriers, the method comprising the steps of:

providing a virtual mobile network operator;

providing a short message system center interface that enables said network operator to communicate with the one or more personal communication system carriers through one or more short message system centers using one or more air interface access techniques; and

providing an application aggregation device that enables said network operator to communicate with said one or more wireless application operators, further enabling the network operator to provide one or more wireless applications to said one or more personal communication system carriers.

21. The method as recited in claim 20, wherein the method further comprises the step of providing an Internet gateway that converts and reformats a first text language to a second text language to enable communication of data information between said one or more personal communication system carriers and one or more Internet Service Providers.

22. The method as recited in claim 20, wherein the method further comprises the step of providing an Internet gateway that converts and reformats a first binary language to a second binary language to enable communication of data information between said one or more personal communication system carriers and one or more Internet Service Providers.

23. The method as recited in claim 20, wherein the method further comprises the steps of:

providing one or more databases, wherein said one or more databases comprises at least one of a message database and a subscriber database;

providing a mail client function;

providing a message routing function; and

providing a cross-technology handling function.

24. The method as recited in claim 20, wherein the method further comprises the step of providing one or more billing engines.

25. A method of providing a plurality of wireless applications from one or more wireless application operators to one or more remote users of one or more personal communication systems, the method comprising the steps of:

providing a virtual mobile network operator;

providing a short message system center interface that enables said network operator to communicate with said one or more remote users of said one or more personal communication systems through one or more short message system centers using one or more air interface access techniques; and

providing an application aggregation device that enables said network operator to communicate with said one or more wireless application operators, further enabling the network operator to provide one or more wireless applications to one or more remote users of said one or more personal communication systems.

26. The method as recited in claim 25, wherein the method further comprises the step of providing an Internet gateway that converts and reformats a first text language to a second text language to enable communication of data information between said one or more remote users of said one or more personal communication system carriers and one or more Internet Service Providers.

27. The method as recited in claim 25, wherein the method further comprises the step of providing an Internet gateway that converts and reformats a first binary language to a second binary language to enable communication of data information between said one or more remote users of said one or more personal communication system carriers and one or more Internet Service Providers.

28. The method as recited in claim 25, wherein the method further comprises the steps of:

providing one or more databases, wherein said one or more databases comprises at least one of a message database and a subscriber database;

providing a mail client function;

providing a message routing function; and

providing a cross-technology handling function.

29. The method as recited in claim 25, wherein the method further comprises the step of providing one or more billing engines.

ABSTRACT OF THE INVENTION

171494v1